PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT EXAMINING OPERATION

Applicant: David Callum Johnson

Serial No: 10/671,358 Group Art Unit: 3683

Filed: September 25, 2003 Examiner: Melanie Torres

Att. Docket No.: S1011/20159 (Case #287) Confirmation No.: 7092

For: COMPOSITE ARTICLE

PRE-APPEAL BRIEF REQUEST FOR REVIEW

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

Applicant hereby requests review of the Final Rejection in the above-identified application.

No amendments are being filed with this request.

This request is being filed with a Notice of Appeal.

The review is requested for the reasons stated on the attached sheets entitled Remarks/Arguments. The Remarks/Arguments section does not exceed five pages in length.

Respectfully submitted,

CAESAR, RIVISE, BERNSTEIN,
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March 20, 2007

By: 

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REMARKS/ARGUMENTS IN SUPPORT OF
PRE-APPEAL BRIEF REQUEST FOR REVIEW

In response to the Final Office Action dated January 16, 2007, favorable reconsideration is respectfully requested in view of the following remarks. A Notice of Appeal in compliance with 37 C.F.R. 41.31 is filed concurrently herewith. Claims 1, 2, 5-9 and 15 are pending.

ERRORS IN THE EXAMINER'S REJECTIONS UNDER 35 U.S.C. § 103:

Claims 1, 2 and 15 were rejected as being unpatentable for obviousness over U.S. Patent No. 6,057,022 (Purdy) in view of U.S. Patent No. 3,897,582 (Olcott) or EP 1260729 (Johnson). Claims 1, 2, 5-9 and 15 were rejected as being unpatentable over U.S. 6,042,935 (Krenkel) or U.S. Publication No. 2003/0057040 Al (Bauer) or U.S. Patent No. 6,221,475 (Domergue) or U.S. Application No. 2002/0068164 Al (Martin) in view of GB 2298687 (Fennell) or U.S. Patent No. 6,057,022 (Purdy) or U.S. Patent No. 6,079,525 (Dietrich) and further in view of U.S. Patent No. 3,897,582 (Olcott) or EP 1260729 (Johnson). It is respectfully requested that the Pre-Appeal Brief Review Conference Panel withdraw these rejections.

Independent claim 1 relates to an aircraft brake heat pack brake disc in the form of a composite article comprising a core layer having a face portion and a wear layer attached to the face portion, wherein the core layer is a C-C composite article impregnated with a refractory carbide and the wear layer has a density lower than the core layer. Turning to the Examiner's first objection, Purdy discloses methods of chemical vapor infiltration designed to result in a C-C structure having varying degrees of densification within a unitary structure. In contrast, the structure required by claim 1 is not a unitary body. In any case, at line 63 to 65 of column 8 of Purdy, it is stated that a symmetrical density gradient is desirable for brake disc applications. It

is clear that this passage relates to the embodiment shown in Figure 9 which incorporates a face 80 having a higher density than the core. Therefore, Purdy does not disclose a wear layer attached to a core layer where the wear layer has a density less than the core layer, as required by pending claim 1.

The Examiner would appear to be of the opinion that these deficiencies would be rectified if Purdy were combined with Olcott or Johnson. Olcott relates to the provision of SiC aciculae to ensure increased erosion resistance in a friction element. Further, it is notable that the only example disclosed therein in which the composition varies through an article shows the outermost portion of the microcomposite having a higher refractory carbide content (and by implication a higher density) than the core of the microcomposite. In contrast, claim 1 requires that the core portion has a higher density than the wear portion.

Therefore, if the person skilled in the art were to combine Purdy with Olcott, he would not come up with an article in which there is a distinct wear portion and core portion which are attached to each other and wherein the wear portion is of a lower density than the core portion.

Johnson discloses methods of forming a composite article comprising a carbon matrix containing, within its interior, refractory carbide particles, which are substantially individually encapsulated within deposited carbon. In relation to brake discs, Johnson teaches one skilled in the art that the radial density of a disc may be non-uniform in order to facilitate machinability in certain regions. There is no teaching of altering the axial density so as to provide a less dense wear layer. Hence, a combination of Purdy with Johnson would not give a brake disc having a wear layer attached to, and of a lower density than, a core layer, as required by present claim 1.

Turning to the Examiner's second rejection, it is submitted that not one of the twenty four combinations invoked by the rejection discloses each and every required feature of claim 1.

The applicant submits that each cited document is deficient in relation to the subject matter of present claim 1 in at least one required feature, the absence of which required feature is common to every cited document. Therefore, no matter how the person skilled in the art were to combine the cited documents (whether permissibly or otherwise) he would not come up with an article having every required feature of claim 1 of the present application. Hence, no objection under 35 USC §103 (a) could be sustained based on the cited documents.

Briefly taking each document in turn, Krenkel considers a distinct core and wear face, but it proposes that SiC should be present at the wear face. Hence, this region (the wear face) would have a density equal to or higher (not less than) the core. Similarly, in Bauer, SiC is provided predominantly at the wear face [see, for example, paragraphs 0028, 0030 and 0032]. Hence, the wear face region in Bauer would not have a lower density than the core. Domergue discloses a brake disc in which C-C composites are infiltrated with SiC to provide a densified structure. While the infiltration may extend throughout the disc (*i.e.*, axially), it is also envisaged that infiltration will occur just at the wear surfaces [see column 9 at lines 15 to 34]. Clearly, the teaching of Domergue in relation to disc density is two-fold; either the disc is to have uniform axial density (infiltration throughout the disc), or it is to have non-uniform axial density, but the density is to be higher (not lower) at the wear faces. In Martin, which discloses a brake disc for a motor vehicle not an aircraft, SiC is present throughout the material including the wear region, as is discussed at paragraph 0021 of Martin. In all cases, the disc according to Martin is infiltrated

with silicon after formation, *i.e.*, from the friction face. This would result in the core having either the same or lower (not higher) density than the friction faces. Dietrich discloses a disc and pad friction couple with the pad friction surface being of a lower density than the disc. The person skilled in the motor vehicle (not aircraft) brake arts understands that the configuration of Dietrich is normally employed to cause the pad to wear in preference to the disc for maintenance purposes. In any case, there is no disclosure in Dietrich of a disc having a wear portion which is of a lower density than a core portion to which it is attached. Fennel does not disclose a structure in which a wear layer is attached to a face portion of a core layer. Rather, the core layer and wear layer are laid up together in a single operation [see pages 11 to 13]. Moreover, on page 10, it is clearly stated that the teaching of Fennell "leads to a final composite structure in which the overall composite density is less in the drive regions than the friction regions because the density of the carbon fibers is generally less than that of the deposited carbon matrix material." As regards disc density, therefore, it is submitted that all Fennell discloses is that the radial density may be non-uniform, but the axial density (in the region of the wear face or friction surface), is uniform.

The respective deficiencies of Purdy, Olcott and Johnson have been discussed above. Hence, it is submitted that the above discussion should also generally apply in respect of the Examiner's second reject ion.

It is submitted, therefore, that as the required feature of present claim 1 of a wear layer attached to a face portion of a core layer with the wear layer having a lower density than the core layer is absent from each and every one of the cited prior art documents, no combination

(permissible or otherwise) made up of any or all of these documents can support the Examiner's objection.

Furthermore, the applicant submits that the preceding discussion should also generally apply in relation to the other independent claims, claim 6 and claim 15.

Finally, the applicant submits that the Examiner has repeatedly failed to understand the thrust of the present invention, namely that the core layer (rather than the wear layer) is impregnated with refractory carbide, as a result of which the density of the core layer is higher than the density of the wear layer.

This is contrary to what the Examiner herself acknowledges in paragraph 2 of the Final Rejection would have been obvious to one of ordinary skill in the art at the time the invention was made, namely "to impregnate a C-C wear laver with refractory carbide to improve the adhesion [SiC] characteristics of wear layers and to provide heat sink capabilities for use in making friction materials" (emphasis added).

Accordingly, the Pre-Appeal Brief Conference Panel is respectfully requested to withdraw the appealed rejections and pass this application on to issuance.

Respectfully submitted,

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March 20, 2007

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